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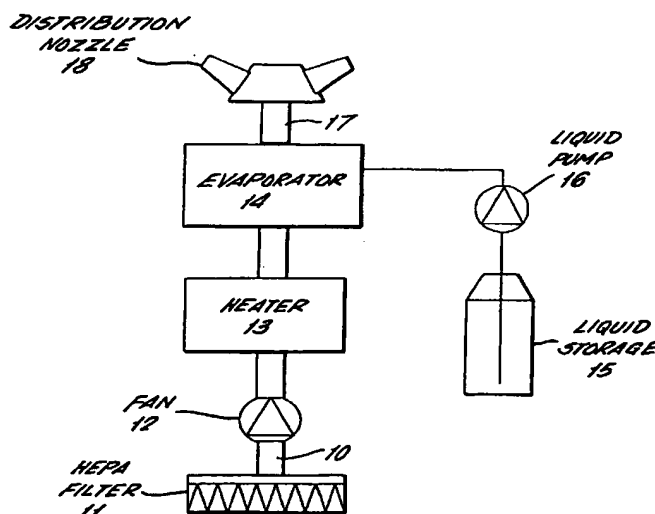
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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,

[Continued on next page]

(54) Title: METHODS AND APPARATUS FOR DECONTAMINATING ENCLOSED SPACES



(57) Abstract: The disclosure relates to a portable apparatus for decontaminating an enclosed room or other space comprising a passageway (17) having an air inlet at one end and an outlet at the other end. A pump (12) to cause a flow of air through the passageway from the inlet to the outlet. A heater (13) to heat the air flowing through the passageway to a predetermined temperature, and a flash evaporator (14) in communication with the passageway. Liquid decontaminant is pumped (16) from a supply (15) of decontaminant to the evaporator (14) to be evaporated and for the evaporant to be delivered to the air flow in the passage (17) to flow in the air flow from the outlet to the rooms to be decontaminated. A universally rotating nozzle (18) is provided at the outlet to distribute the decontaminant containing air throughout the enclosure.

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AMENDED CLAIMS

**[Received by the International Bureau on 22 September 2003 (22.09.2003);
original claims 1 and 20 replaced by amended claims 1 and 20, original
claims 2-19 and 21-25 unchanged
(6 pages)]**

1. A method of decontaminating an enclosed space comprising the steps of creating within the enclosed space hydrogen peroxide/water vapour from a supply of aqueous solution of hydrogen peroxide located within the enclosed space, generating a flow of heated air within the enclosed space, introducing the hydrogen peroxide/water vapour into the flow of heated air to be carried by the air flow, distributing the air flow carrying the hydrogen peroxide/water vapour throughout the enclosed space and over any surfaces in the enclosed space for a period of time sufficient to achieve bio-decontamination and then removing the hydrogen peroxide vapour from the enclosed space.

2. A method as claimed in claim 2, wherein hydrogen peroxide/water vapour is added to the flow of heated air circulated in the enclosure until the dew point of the vapour is reached and condensation of hydrogen peroxide/water vapour on the surfaces of the enclosure takes place following which the hydrogen peroxide is removed from the enclosed space.

3. A method as claimed in claim 2, wherein the measurement of the condensation of vapour is measured by a monitor and when the condensation has reached a requisite level, air flow containing hydrogen peroxide/water vapour is terminated.

4. A method as claimed in claim 2 or claim 3, wherein condensation is measured in the enclosure at a number of locations by condensation monitors to

ensure that condensation has taken place throughout the enclosure.

5. A method as claimed in claim 1, wherein air
5 carrying hydrogen peroxide/water vapour is introduced into the enclosure until a predetermined concentration of hydrogen peroxide/water vapour in the atmosphere in the enclosure has been reached after which introduction of the air is terminated and
10 the hydrogen peroxide is removed.

6. A method as claimed in claim 5, wherein biological indicators are used in the enclosure to determine when the concentration of hydrogen
15 peroxide/water vapour in the atmosphere in the enclosure has reached the requisite level following which the hydrogen peroxide is removed.

7. A method as claimed in any of the preceding
20 claims, wherein the heated air carrying hydrogen peroxide/water vapour is delivered as a jet within the enclosure.

8. A method as claimed in claim 7, wherein the
25 heated air carrying hydrogen peroxide/water vapour is delivered in a universally rotating jet to distribute the vapour throughout the enclosure.

9. A method as claimed in any of the preceding
30 claims, wherein one or more fans are provided spaced from the delivery of air carrying hydrogen peroxide/water vapour into the enclosure to deliver air carrying the vapour to remote locations of the enclosure from said source.

10. A method as claimed in any of the preceding claims, wherein the vapour of hydrogen peroxide and water also contains peracetic acid.
- 5 11. A method as claimed in claim any of claims 1 to 9, wherein the solution from which the hydrogen peroxide/water vapour is produced contains 30 to 35% hydrogen peroxide and a balance of water.
- 10 12. A method as claimed in claim 10, wherein the solution from which the hydrogen peroxide solution is produced comprises 15% hydrogen peroxide, 0.5% peracetic acid and a balance of water.
- 15 13. A method as claimed in any of the preceding claims, wherein hydrogen peroxide is removed by circulating the air containing hydrogen peroxide over a catalyst.
- 20 14. A method as claimed in any of claims 1 to 8, wherein the hydrogen peroxide is removed from the enclosure using the heating/ventilation air conditioning system for the room.
- 25 15. A method as claimed in any of the preceding claims, wherein a plurality of heated air flows are provided to which the hydrogen peroxide/water vapour is added to provide a plurality of flows of heated air carrying hydrogen peroxide/water vapour at
- 30 different locations in the enclosure.
16. A method as claimed in any of the preceding claims, wherein the method is controlled from outside the enclosure.

17. A method as claimed in any of the preceding claims, wherein the air is dehumidified to reduce the relative humidity in the enclosure to a predetermined level prior to delivering heated air containing
5 hydrogen peroxide/water vapour to the enclosure.

18. A method as claimed in claim 17, wherein the air is dehumidified using an air conditioned system for the enclosed space.

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19. A method as claimed in any of the preceding claims, wherein a portable apparatus is used in the enclosure having a duct with a fan for delivering air through the duct, a filter for filtering air entering
15 the duct, a heater for heating air passing through the duct and means for delivering hydrogen peroxide/water vapour to the air passing through the duct and a nozzle for delivery of air carrying hydrogen peroxide/ water vapour from the duct, the
20 nozzle being rotated universally to distribute the hydrogen peroxide/water vapours throughout the enclosure, circulation of air carrying the hydrogen peroxide/water vapour through the duct causing decontamination of the duct.

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20. An apparatus for decontaminating an enclosed space comprising a self-contained unit having a duct to be positioned within the enclosed space having an inlet end and an outlet end, a fan for causing air to
30 flow from the enclosed space through the duct, a filter for filtering air at the inlet end of the duct, means for holding a supply of aqueous hydrogen peroxide solution, means for delivering aqueous hydrogen peroxide solution from said holding means to

a heater to flash evaporate the aqueous hydrogen peroxide to produce hydrogen peroxide/water vapour which is entrained in the air flow passing through the duct, a nozzle at the outlet end of the duct and
5 means to rotate the nozzle universally to deliver hydrogen peroxide/water vapour throughout the enclosure, all internal and external surfaces of the apparatus open to the enclosure being exposed to the hydrogen peroxide/water vapour carrying air in the
10 enclosure to decontaminate the surfaces.

21. An apparatus as claimed in claim 20, wherein the components of the apparatus are mounted in a support for transport of the apparatus.
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22. An apparatus as claimed in claim 21, wherein the self-contained unit is a mobile or portable unit for movement from location to location where it is to be used.
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23. An apparatus as claimed in claim 22, wherein the supply of hydrogen peroxide/water vapour and/or the nozzle and means to rotate the nozzle are readily removable for transport of the apparatus.
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24. An apparatus as claimed in any of claims 1 to 23 including a control box for controlling operation of the apparatus, wherein means are provided for delivering air carrying hydrogen peroxide/water
30 vapour from the atmosphere in the enclosure around the control box through the control box to decontaminate inner surfaces of the control box.

25. An apparatus as claimed in any of claims 20 to
24 including a separate monitoring unit for
monitoring the temperature of the atmosphere in the
enclosure and the concentration of hydrogen peroxide/
5 water vapour in the atmosphere, wherein means are
provided for delivering a flow of air carrying
hydrogen peroxide/water vapour through the enclosure
of the monitoring unit to decontaminate interior
surfaces of the monitoring unit.

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